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EXAMINER	
NGUYEN, KHAI MINH	
ART UNIT	**PAPER NUMBER**
2617	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/967,048	KASAPI, ATHANASIOS A.	
	Examiner	Art Unit	
	KHAI M. NGUYEN	2617	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 July 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9 and 11-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9,11,13-14, and 16-22* is/are rejected.

7)☒ Claim(s) *12 and 15* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-9 and 11-22 have been considered but are moot in view of the new ground(s) of rejection.

Namekata clearly discloses splitting the data signal into a plurality of sub-carriers (fig.4: subcarrier 1-M) to at least partially redundantly transmit the information over a multi-carrier wireless communication channel (col.3, lines 51-64 :the OFDM signals transmitted through the plurality of antenna elements));

Namekata clearly discloses splitting each of the sub-carriers into N signals one for each of a plurality of antenna paths (fig.2-4: item 42, and fig.6: item 60), wherein each of the sub-carriers is to be transmitted over an array of N antennas (21-M) using a different antenna path for each signal (col.15, lines 14-23: each subcarrier of the OFDM signal transmitted by each antenna element);

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-9, 11, 13-14, 16-17, and 19-22 are rejected under 35 U.S.C.103(a) as being unpatentable over Namekata (U.S.Pat-6249250) in view of Smith et al. (U.S.Pat-5912927).

Regarding claim 1, Namekata teaches a method comprising:

splitting the data signal into a plurality of sub-carriers (fig.4: subcarrier 1-M) to at least partially redundantly transmit the information over a multi-carrier wireless communication channel (col.3, lines 51-64 :the OFDM signals transmitted through the plurality of antenna elements));

splitting each of the sub-carriers into N signals one for each of a plurality of antenna paths (fig.2-4: item 42, and fig.6: item 60), wherein each of the sub-carriers is to be transmitted over an array of N antennas (21-M) using a different antenna path for each signal (col.15, lines 14-23: each subcarrier of the OFDM signal transmitted by each antenna element);

modifying each of the sub-carriers by a set of complex weights (col.15, lines 29-34), the sets of complex weights having a complex weight for each antenna path (col.15, lines 55-60), to ensure that each of the N signals of each sub-carrier (fig.2-4: subcarrier 1-M) of the wireless communication channel propagates along a different physical path to the receiver (fig.1, col4, line 63 to col.5, line 3, and col.6, lines 31- 42), wherein the set of complex weights used to modify each of the sub-carriers includes different weights for each antenna path of the array (col.15, lines 14-23: difference between the transmitting excitation weights, and calculates the transmitting excitation weight of each subcarrier of the OFDM signal transmitted by each antenna element).

Namekata and Boariu fail to specifically disclose receiving information in the form of data signal for transmission to a receiver.

However, Smith teaches receiving information in the form of data signal for transmission to a receiver (fig.2).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to teaching of Smith to Namekata improve diversity in communication system by using Walsh codes.

Regarding claim 2, Namekata teaches each element of the set of complex weights scales one or more of a sub-carrier's amplitude and/or phase at an associated transmission antenna (col.10, lines 47-60).

Regarding claim 3, Namekata teaches developing a set of complex weights including:

choosing substantially different weights, for each sub-carrier sharing information (col.15, lines 55-65); and iteratively repeating until all sub-carriers have been modified (col.15, lines 55-65).

Regarding claim 4, Namekata teaches the substantially different weights are chosen to be orthogonal to the others (col.3, lines 51-64).

Regarding claim 5, Namekata teaches a method according to claim 3, wherein developing a set of complex weights comprises: selecting weight vector(s) to be applied to each of the sub-carriers from a pre-determined set of weight vectors (col.3, lines 51-64, and col.15, lines 55-65).

Regarding claim 6, Namekata teaches a method according to claim 1, further comprising: transmitting the modified sub-carriers (col.15, lines 55-65).

Regarding claim 7, Namekata teaches a transceiver comprising:

split the data signal into a plurality of sub-carriers (fig.4: subcarrier 1-M) to at least partially redundantly transmit the information over a multi-carrier wireless communication channel (col.3, lines 51-64 :the OFDM signals transmitted through the plurality of antenna elements)) and to split each of the sub-carriers into N signals one for each of a plurality of antenna paths (fig.2-4: item 42, and fig.6: item 60), wherein each of the sub-carriers is to be transmitted over an array of N antennas using a different antenna path for each signal (col.15, lines 14-23: difference between the transmitting excitation weights, and calculates the transmitting excitation weight of each subcarrier of the OFDM signal transmitted by each antenna element);

a diversity agent (fig.4: item 42), operable to selectively apply a set of complex weight values to each of the sub-carriers (fig.2-4: subcarrier 1-M, col.15, lines 29-34 and line 55-60), the sets of complex weights having a complex weight for each antenna path to introduce spatial diversity between such sub-carriers (fig.1, col4, line 63 to col.5, line 3, and col.6, lines 31- 42); and

a transmit module (fig.1), coupled with the diversity agent (fig.1: item 4), operable to receive the modified sub-carriers and transmit the signals to generate the multi-carrier communication channel with intra-channel spatial diversity (fig.1, col.4, line 63 to col.5, line 3, and col.6, lines 31- 42), wherein each of the set of complex weight values

include a plurality of weight values each associated with a different one of a plurality of antenna paths of an antenna array through which the sub-carriers are transmitted (col.15, lines 14-23: difference between the transmitting excitation weights, and calculates the transmitting excitation weight of each subcarrier of the OFDM signal transmitted by each antenna element).

Namekata and Boariu fail to specifically disclose a splitter module, operable to receive a data signal for transmission to a receiver.

However, Smith teaches a splitter module (fig.2: item 216), operable to receive a data signal for transmission to a receiver (fig.2).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to teaching of Smith to Namekata improve diversity in communication system by using Walsh codes.

Regarding claim 8, Namekata teaches the plurality of signals received from at the diversity agent (fig.4: item 42) are baseband signals (col.7, lines 13-27).

Regarding claim 9, Namekata teaches the multi-carrier communication channel is comprised of a plurality of sub-carrier signals (fig:4: subcarrier 1-M), each having a disparate set of complex weights introduced at a baseband of the sub-carriers to effect the spatial diversity between the sub-carriers (col.7, lines 13-27 and col.7, line 59 to col.8, line 2).

Regarding claim 11, Namekata teaches the transceiver is operable to develop the set of complex weight values for a given baseband signal to be maximally orthogonal complex weight values applied to another baseband signal (col.3, lines 51-64).

Regarding claim 13, Namekata teaches the transmit module is operable to upconvert and amplify each of the modified baseband signals (col.7, lines 13-27) to generate a plurality of spatially diverse sub-carriers (col.3, lines 51-64).

Regarding claim 14, Namekata teaches the transmit module operable to transmit each of the sub-carriers to one or more receiver(s) (col.3, lines 51-64).

Regarding claim 16, Namekata teaches the multi-carrier wireless communication channel uses Orthogonal Frequency Division Multiplexing (OFDM) (col.3, lines 51-64).

Regarding claim 17, Namekata teaches the transceiver of claim 7, wherein the multi-carrier communication channel uses Orthogonal Frequency Division Multiplexing (OFDM) (col.3, lines 51-64).

Regarding claim 19, Namekata teaches the transceiver develops the set of complex weights to have inter-channel spatial diversity with respect to at least one communication channel of at least one other transceiver (col.3, lines 51-64).

Regarding claims 20 and 22, claims 20 and 22 substantially contain the same limitations as of the limitations of claim 7. Therefore, claims 20 and 22 are likewise rejected on the same grounds as of claim 7.

Regarding claim 21, Namekata teaches each of the set of complex weight values are comprised of a plurality of weight values each associated with one of a plurality of antennae comprising an antenna array through which the sub-carriers are transmitted (col.3, lines 51-64).

4. Claim 18 is rejected under 35 U.S.C.103(a) as being unpatentable over Namekata (U.S.Pat-6249250), in view of Smith et al. (U.S.Pat-5912927), and further in view of Wu (6985434).

Regarding claim 18, Namekata and Smith fail to specifically disclose the transceiver is selected from a base station and a wireless telephony subscriber unit.

Wu teaches the transceiver is selected from a base station and a wireless telephony subscriber unit (col.5, lines 55-63).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to teaching of Wu to Namekata and Smith reduce adverse signal fading (increase the data rate capacity).

Allowable Subject Matter

5. Claims 12 and 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KHAI M. NGUYEN whose telephone number is (571)272-7923. The examiner can normally be reached on 8:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vincent P. Harper can be reached on 571.272.7605. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/VINCENT P. HARPER/
Supervisory Patent Examiner, Art Unit 2617

/Khai M Nguyen/
Examiner, Art Unit 2617 12/15/2009